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| EXAMINER |
|---|
| PROCTOR, JASON SCOTT |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2123 | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/586,610 | TISSEAU ET AL. | |
| | Examiner | Art Unit | |
| | JASON PROCTOR | 2123 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *25 May 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *11-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *11-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 July 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/16/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

Claims 1-10 were canceled by preliminary amendment submitted on 19 July 2006.

The preliminary amendment entered new claims 11-20. Claims 11-20 are presented for examination.

Claims 11-20 are rejected.

### *Priority*

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### *Information Disclosure Statement*

2. The information disclosure statement (IDS) submitted on 16 October 2006 was filed before the mailing date of the first Office Action. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

### *Specification*

3. The disclosure is objected to because it contains an embedded hyperlink and/or other form of browser-executable code. Applicant is required to delete the embedded hyperlink and/or other form of browser-executable code. See MPEP § 608.01. The objectionable material is found on page 16.

### *Claim Rejections - 35 USC § 101*

35 U.S.C. § 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. Claims 11-20 are rejected under 35 U.S.C. § 101 because the claimed invention is directed to non-statutory subject matter.

Claims 11-20 define a "device for simulating the real world, configured to be implanted in a computer" which appears to be purely software *per se*. None of the "components" of the claimed device appear to be a physical or tangible claim element. The disclosure of the invention describes computer software. Therefore, interpreting the claim language in light of the disclosure, the claimed "device" appears to be computer software *per se*. Computer software is none of the categories of invention described in 35 U.S.C. § 101.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. § 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 11-20 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Where the claim language recites "and/or," this phrase is interpreted as meaning "or".

Where the claim language recites the word "capable," this word is interpreted according to its standard definition.

Claim 11 recites "so as to apply each of ***its*** functions to the current state of each state object which ***it*** defines to evolve ***its*** state to a new current state" which renders the claim vague and indefinite. According to the antecedent basis established in the claim, the "functions" are components of "interaction objects," the "state objects" are defined by "at least one spatial and/or time data item and/or at least one property data item," and the "state" refers to a "state objects". Therefore, this claim recites the word "it" or "its" three times and each appears to refer to a different entity. It is unclear if this interpretation is correct. This use of pronouns renders the claim vague and indefinite.

Claims 15 and 16 recite the phrases "intensive variable" and "extensive variable". It is unclear what the words "intensive" or "extensive" mean in the context of the specification and the claimed invention. As a result, these claims are vague and indefinite. For the purposes of examination, these phrases are both interpreted as "variable".

Claims 17, 18, and 19 recite the phrase "sub-objects" which is not clearly described in the specification or the claim language. As a result, these claims are vague and indefinite. In light of the specification, this phrase appears to mean "sub-class," as in the context of object-oriented programming or object-oriented modeling.

Claims rejected but not specifically mentioned stand rejected by virtue of their dependence.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. § 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. § 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. § 103(c) and potential 35 U.S.C. § 102(e), (f) or (g) prior art under 35 U.S.C. § 103(a).

6. Claims 11-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over "The Swarm Simulation System and Individual-based Modeling" by David Hiebeler ("Hiebeler") in view of "Swarm User Guide" by Paul Johnson et al. ("Johnson").

Regarding claim 11, Hiebeler teaches a device for simulating the real world, configured to be implanted in a computer configured to support a multi-task mode programming by activated objects representing systems to be simulated, including software simulating by objects shared evolution of at least some of the activated objects [*"Swarm is a simulation environment which facilitates development and experimentation with simulations involving a large number of agents behaving and interacting within a dynamic environment."* (Hiebeler, abstract); *In the most general sense, Swarm is intended to provide an environment that facilitates the development of simulations involving a number of agents which exist within some (possibly dynamic) environment. This environment may be a regular spatial environment, a non-spatial environment such as a well-stirred soup, or something more abstract such as a telecommunications network. The agents communicate with each other and with the environment via messages"* (Hiebeler, page 4)], comprising:

state objects each comprising at least one spatial and/or time data item and/or at least one property data item, defining a current state [*"An object in Swarm has three main characteristics:* Name, Data, *and* Rules... *The Data are whatever local data the user wants to have in the agent (e.g. internal state variables)."* (Hiebeler, page 5)];

interaction objects each containing a designation of at least one of the state objects and of at least one function applicable to at least one of the state objects, and defining at each instant a

topology of the system being simulated [*"The Rules are a set of functions that handle any messages that are sent to the object, including the "step" message."* (Hiebeler, page 5); *"Agents are the objects written by the user... When users write code for a new type of agent, there are several things that they must supply: ... A* step *function, invoked on every time step (this is optional; users can write agents that have no internal dynamics, but only respond to messages from other agents); Action functions that handle messages sent to the agent by other objects."* (Hiebeler, page 5)].

Johnson teaches a simulation manager configured to operate by sequences on a selection of interaction objects and to activate each interaction object once only with each sequence, according to an order varying in at least partly random manner from one sequence to the next, so as to apply each of its functions to the current state of each state object which it defines to evolve its state to a new current state [*"The actions that go on in a simulation are orchestrated by objects that respond to the* Schedule *protocol."* (Johnson, page 64); *"The first three lines in the method create the* Schedule *named* modelSchedule... *Between the* createBegin *and* createEnd *methods, the only detail that this* Schedule *sets is the repeat interval, which is one. That means that all of the actions assigned to the* modelSchedule *will be executed each time step."* (Johnson, page 64); *An* ActionGroup *is a set of actions that are supposed to happen in sequence. The* buildActions *method is often designed to first create an* ActionGroup *and then to schedule that it is to be repeated every now and then... // One time tick, a set of several actions: // randomize the order of agent updates (to be fair) ... shuffler message: M(shuffleList : )..."* (Johnson, pages 68-69)].

Hiebeler and Johnson are analogous art because they are directed to the same type of simulation software.

It would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Hiebeler and Johnson since Hiebeler expressly suggests that *"The current system uses a discrete time-stepped scheduling algorithm - on each time step, every object in the system receives a 'step' message, directing the agent to perform some unit of computation. This scheduling mechanism could be easily modified in some ways, for example to perform asynchronous random updating of objects; the next version of Swarm will provide even more flexible scheduling algorithms."* (Hiebeler, page 4). Therefore Hiebeler expressly suggests that an advantageous flexible scheduling system has been conceived and would be obvious to combine with the disclosed Swarm system. The Johnson reference describes a later version of the same Swarm system that implements that advantageous flexible scheduling system. The combination formed in this rejection is suggested and taught by the prior art as shown above.

Therefore it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Hiebeler and Johnson to arrive at the invention specified in claim 11.

Regarding claim 12, Hiebeler teaches that the simulation software comprises internal interaction objects, each capable of containing designation of a single state object and at least one function applicable to the single state object, and mutual interaction objects, each capable of

containing the designation of at least two state objects and at least one function applicable to property data of the designated state objects [*"The Rules are a set of functions that handle any messages that are sent to the object, including the "step" message."* (Hiebeler, page 5); *"Agents are the objects written by the user... When users write code for a new type of agent, there are several things that they must supply: ... A* step *function, invoked on every time step (this is optional; users can write agents that have no internal dynamics, but only respond to messages from other agents); Action functions that handle messages sent to the agent by other objects."* (Hiebeler, page 5)].

Regarding claim 13, Hiebeler teaches that the simulation software is configured to modify at least some of the functions according to at least one property data item of at least one associated state object [*"Rather than building assumptions into Swarm about the type of environment agents would move around in, the notion of space was encapsulated within object. Currently, almost all of our sample experiments use a two-dimensional lattice space, implemented within an object we call GridSpace2, although other types of spaces are possible, such as: GridSpaceN, a general N-dimensional lattice. SoupSpace, in which agents meet/collide randomly. This would correspond to non-spatial models which assume thorough mixing. GraphSpace, an arbitrarily-connected graph describing which spatial sites are 'neighbors'... The space keeps track of the locations of any agents that are located in the space. When an agent wishes to move to a new location, it sends a request to space indicating where it wants to move; space replies, telling the agent where it actually ended up."* (Hiebeler, page 6)].

Regarding claim 14, Hiebeler teaches that the simulation software is configured to select at least some of the functions according to at least one property data item of at least one associated state object [*"Rather than building assumptions into Swarm about the type of environment agents would move around in, the notion of space was encapsulated within object. Currently, almost all of our sample experiments use a two-dimensional lattice space, implemented within an object we call GridSpace2, although other types of spaces are possible, such as: GridSpaceN, a general N-dimensional lattice. SoupSpace, in which agents meet/collide randomly. This would correspond to non-spatial models which assume thorough mixing. GraphSpace, an arbitrarily-connected graph describing which spatial sites are 'neighbors'... The space keeps track of the locations of any agents that are located in the space. When an agent wishes to move to a new location, it sends a request to space indicating where it wants to move; space replies, telling the agent where it actually ended up."* (Hiebeler, page 6)].

Alternatively, see Johnson, pages 68-69, teaching that an "ActionGroup" is a set of actions (i.e. functions to be executed), wherein the ActionGroup itself is a property data item of some associated state object.

Regarding claim 15, Hiebeler teaches that at least some of the state objects comprise a property data item representing an intensive variable [*"An object in Swarm has three main characteristics:* Name, Data, *and* Rules... *The Data are whatever local data the user wants to have in the agent (e.g. internal state variables)."* (Hiebeler, page 5)].

Regarding claim 16, Hiebeler teaches that at least some of the interaction objects have a function bringing about an extensive or intensive variable [*"An object in Swarm has three main characteristics:* Name, Data, *and* Rules... *The Data are whatever local data the user wants to have in the agent (e.g. internal state variables)."* (Hiebeler, page 5)].

Regarding claim 17, Johnson teaches that at least some of the state objects comprise state sub-objects [*"Object oriented programming (OOP) is well suited to describe autonomous agents, so it should have appeal to scientists and modelers on that basis alone... The features we emphasize here are encapsulation and inheritance."* (Johnson, page 18)].

Regarding claim 18, Johnson teaches that at least some of the state objects comprise interaction sub-objects operating on the said state sub-objects [*"The objects that represent the actors in a simulation - the substantively important entities - are usually subclassed from the* SwarmObject *class. The 'inheritance hierarchy' that leads to the class* SwarmObject *passes through classes that allow the creation and deletion of objects from a simulation."* (Johnson, page 29); The claim appears to be referring to class inheritance, a well-known concept taught by Johnson at the portion cited and elsewhere.].

Regarding claim 19, Johnson teaches that the simulation software comprises classes of objects defining structures of state objects and of interaction objects, the state objects and interaction objects being derived from these classes by instancing [*"Objects are created through*

*a process called 'instantiation.' Put tersely, code is written in 'classes' and then objects are created as instances of their classes."* (Johnson, page 17)].

Regarding claim 20, Johnson teaches that the simulation software comprises a scheduler capable of operating according to one of two modes selected from a real-time mode, in which it operates according to a selected frequency, and a virtual-time mode in which it operates periodically but for durations which vary from one period to another [*"A Swarm simulation proceeds in discrete time steps."* (Johnson, page 19)].

## ***Conclusion***

Art considered pertinent by the examiner but not applied has been cited on form PTO-892.

"The Swarm Simulation System: A Toolkit for Building Multi-Agent Simulations" by Nelson Minar, et al., teaches additional features of the Swarm system described by Hiebeler and Johnson.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Proctor whose telephone number is (571) 272-3713. The examiner can normally be reached on 8:30 am-4:30 pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached at (571) 272-3753. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: 571-272-2100. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Jason Proctor/
Examiner
Art Unit 2123

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